$$\therefore\ v=\frac{x}{2\cos\theta}\sqrt{\frac{2g}{x\tan\theta-y}}\ \ldots.(1).$$

$x=OG=OF+FG=OF+CH+HK=26+14\sin\theta.$

$y=GD=BD-BK-KG=72-14-14\cos\theta=58-14\cos\theta.$

$$\therefore\ v=\frac{(13+7\sin\theta)}{\cos\theta}\sqrt{\frac{g}{(13+7\sin\theta)\tan\theta+7\cos\theta-29}}.$$

When $\theta=30°$, $v=59\sqrt{-3}$ inches, an impossible result.

$\therefore$ $GD>$ than the intersection made by the particle on BD and indicates that the mud would never get 6 feet above the ground.

Let $\theta=60°$, $v=273.17$ inches$=22.76$ feet per second.

$t=5280\div22.76=231.98$ seconds$=3$ minutes, 51.98 seconds, time required to ride a mile.

101. Proposed by ALOIS F. KOVARIK, Instructor in Mathematics and Science, Decorah Institute, Decorah, Iowa.

Find the center of gravity of a cone that has a specific gravity of 1 (one) at the top and 2 (two) at the base.

Solution by G. B. M. ZERR, A. M., Ph. D., The Temple College, Philadelphia, Pa.; WILLIAM W. LANDIS, A. M., Dickinson College, Carlisle, Pa.; H. C. WHITAKER, Ph. D., Manual Training School, Philadelphia, Pa.

Let $y=m(x-a)$ be the equation to the generator of the cone.

$$\text{Then}\ \bar{x}=\frac{\int\rho y^2 x dx}{\int\rho y^2 dx}=\frac{\int_a^{2a}\rho x(x-a)^2 dx}{\int_a^{2a}\rho(x-a)^2 dx}.$$

By the conditions of the problem, $\rho=x/a$.

$$\therefore\ \bar{x}=\frac{\int_a^{2a}x^2(x-a)^2 dx}{\int_a^{2a}x(x-a)^2 dx}=\frac{\frac{31a^5}{30}}{\frac{7a^4}{12}}=\frac{62a}{35}.$$

$\bar{y}=0$. $\dfrac{62a}{35}-a=\dfrac{27a}{35}=$the distance of the center of gravity from the vertex.